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LET'S DEMONSTRATE SOIL AND WATER CONSERVATION FOR BETTER FARMING, BETTER LIVING.

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EIGHTEEN DEMONSTRATIONS ON THE SUBJECT OF SOIL AND WATER CONSERVATION ARE PRESENTED. THESE DEMONSTRATIONS UTILIZE SIMPLE AND INEXPENSIVE EQUIPMENT AND ARE SUITABLE FOR CLASSROOM OR OTHER GROUP USE, ALTHOUGH THEY WERE DESIGNED FOR 4-H CLUBS. LISTED ARE THE EQUIPMENT AND MATERIALS NEEDED, PREVIOUS PREPARATION, STEPS IN THE DEMONSTRATION, AND EXPECTED LEARNINGS. (SF)

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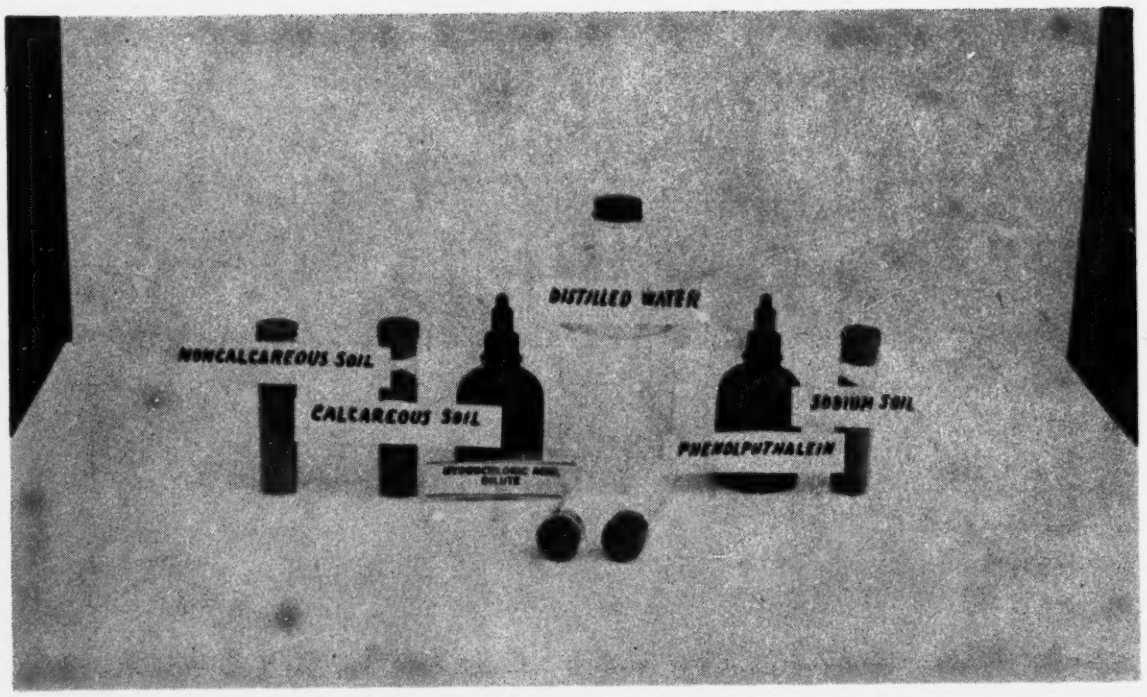
LET'S DEMONSTRATE SOIL & WATER CONSERVATION



FOR BETTER FARMING BETTER LIVING

Cooperative Extension Service

NEW MEXICO STATE UNIVERSITY

RC 002432

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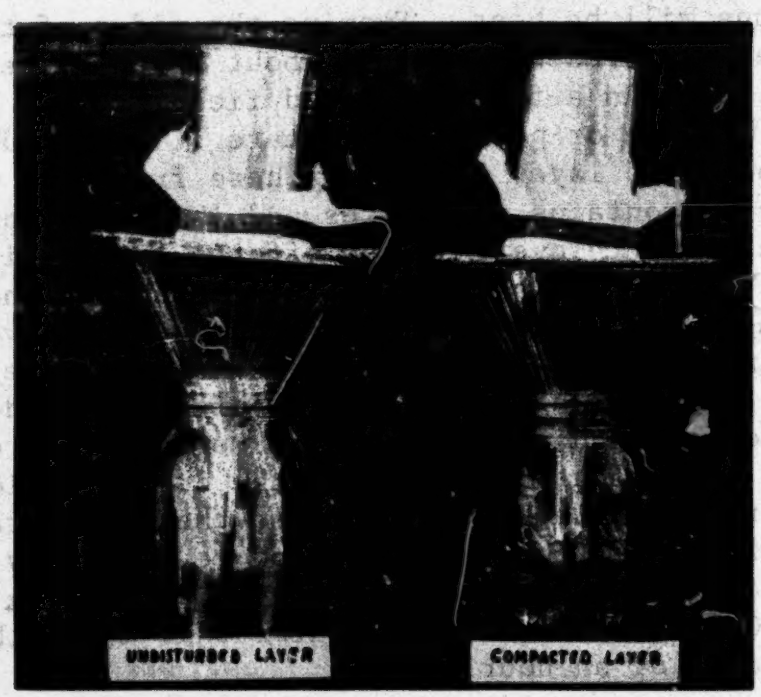
COMPACT LAYERS AFFECT SOIL PERMEABILITY



A. Equipment and Materials

1. Two tin cans about 2 to 3" in diameter and 5 or 6 inches long. Cut the ends out.
2. Two pieces of cheesecloth about 6" square
3. Two heavy rubber bands
4. Two quart jars
5. Two pieces of window screen or hardware cloth about 4" square
6. Field for collecting a compact plow layer and less compact layer
7. Box for transporting samples

B. Previous Preparation

1. Ask your county agent to assist you to obtain the information and materials which are needed to conduct the demonstration.
2. Select a field and rehearse the demonstration several times to get the proper samples and techniques. A deep loam soil is best - one that has been cultivated frequently when wet.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this topic?
   d. What are your experiences or observations with reduced permeabilities due to compacted layers?

2. Steps in the demonstration

   Select an irrigated field that has received frequent cultivations or

plowings when wet a few inches below the surface. Dig a pit about 2 feet deep. During the growing season the center of a row where the large tractor wheel runs will be best. Examine the sides of the pit. Normally the compact layer, if present, will be about 2" to 4" below the surface in a row crop field. In a freshly plowed field it will be directly below plow depth. In alfalfa or permanent pasture it may be directly below the surface. The compacted layer may be anywhere from 2 to 6" thick. Below it the soil usually contains more pores and is less compact. When you have located the compact layer, scrape off the loose soil above it. Then push a can about 3" into this layer. Dig the can out and level off the bottom by shaving off excess soil. Place cheesecloth over bottom of sample and secure to can with rubber band, Place in a relatively close fitting box. Dig below this compact layer, scrape off level and push the second can about 3" into this undisturbed layer. Remove and treat as number 1 can. Be careful in moving these cans to the demonstration table. See that they are not jarred and are kept moist. At the demonstration table place each can over a fruit jar covered with a piece of window screen or hardware cloth. Pour water in each can, maintaining a depth of ½ - 1" during the demonstration. Observe the amount of water that moves through the two layers in 30 minutes or an hour.

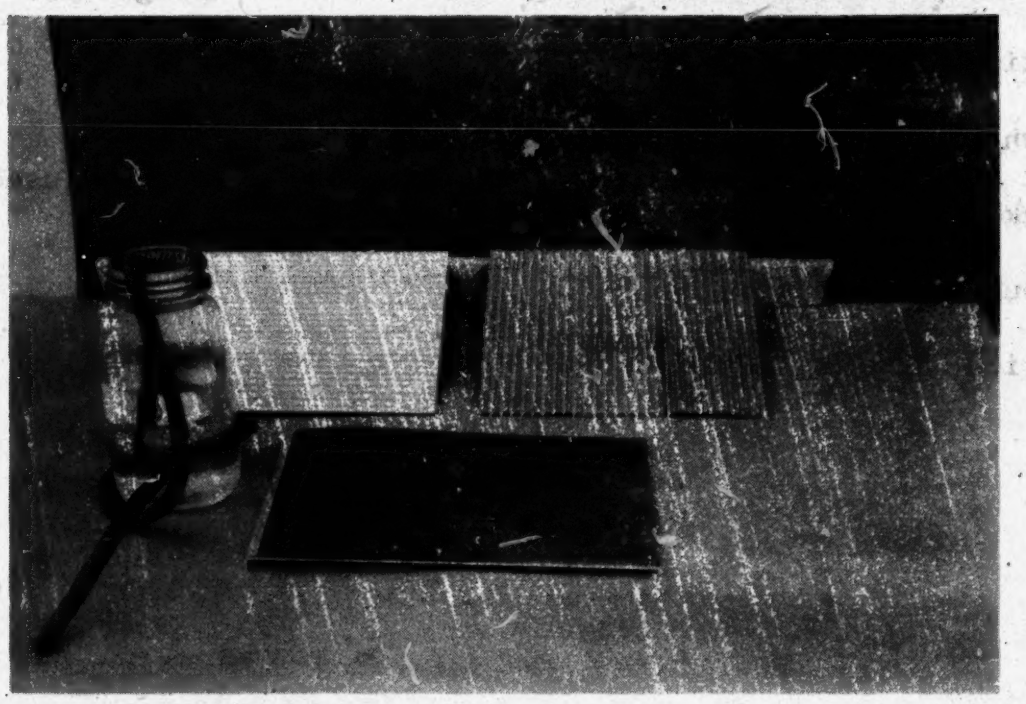
3. Information you should know

   a. What causes compacted layers?
   b. How can they be prevented?
   c. What effect does compaction have on plant growth?

D. Summarize Your Demonstration

E. Question Period

CONTOUR RIDGES SAVE SOIL AND WATER



A. Equipment and Materials

1. Washboard or similar horizontally-corrugated surface
2. Smooth surface or vertically-corrugated surface
3. Smooth surface with blotter on surface
4. Small sprinkler or rain maker
5. Large container - dishpan will do

B. Previous Preparation

1. Obtain all the reference material on contour ridges from your club leader or county agent.
2. Prepare charts and illustrations which will assist you to emphasize main points.

C. The Demonstration

1. Introduction

a. State your name, club and community.
b. What is the purpose of your demonstration?
c. Why did you select this topic?
d. What are your experiences or observations of contour farming?

2. Steps in the demonstration

Hold the washboard somewhat tipped at about a 6 degree slope with the ridges horizontal. Then pour water on it. This shows how contour furrows hold water.

Tilt the washboard slightly at a second angle to show the effects of rows not on contour. Repeat the water pouring process and observation.

Hold the board at a steeper angle with ridges horizontal and note that the furrows still hold water and that the run-off has slowed up. Hold the board at an angle with ridges vertical and pour on water. This represents up and down hill tillage and down hill irrigation.

3. Information you should know

   a. Of what value is contour farming?
   b. What conservation practices other than contours can be used to check water erosion on farm lands?

D. Summarize Your Demonstration

E. Question Period

NOTE: The effects of contour ridges can also be demonstrated by using small boxes filled with sand. Build a mound of soil in each box. Then with your fingers make some furrows running around the mound. Run the furrows on the other mound from top to bottom. Then pour the same amount of water on each mound and observe the results.

EFFECT OF GYPSUM ON WATER MOVEMENT THROUGH A SODIUM (BLACK ALKALI) SOIL

A. Equipment and Materials

1. Soil high in sodium
2. Finely ground gypsum or calcium sulfate
3. Water of good quality
4. Four glass funnels
5. Funnel stand
6. Piece of cotton
7. Four graduated cylinders - 100 ml

B. Previous Preparation

1. Ask your county agent to assist you to obtain the information and materials which are needed to conduct the demonstration.
2. Select a medium textured sodium affected soil and rehearse the demonstration several times to get in the habit of doing everything properly.
3. Set up one set (2 funnels) of this demonstration far enough ahead of time to show a substantial rate of water movement through the treated soil.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this topic?
   d. What are your experiences or observations on reclaiming sodium affected lands?

2. Steps in the demonstration

Place a small plug of cotton at the top of each funnel stem. Fill one funnel about 2/3 full of the sodium soil. Thoroughly mix two level

teaspoons of gypsum in about a half pint of the sodium soil and fill the second funnel to the same depth as the first. Hold each funnel with soil in an upright position and tap stem on the table several times to settle the soil. Place the funnels in the funnel stand with a graduated cylinder under each one. Fill each funnel with water. Over a period of several hours observe the rate of water movement through the treated and untreated soil. Display the set of funnels previously set up.

3. Information you should know

   a. What are the undesirable effects of sodium on soils? Crops?
   b. How does sodium accumulate in the soil?
   c. How does gypsum ($CaSO_4.2H_2O$) improve soil permeability?
   d. Why does water move through the treated soil at a faster rate than through the untreated soil?
   e. Discuss the rate of gypsum application to soils affected by various degrees of sodium.
   f. How does the quality of water effect the reclamation of sodium affected lands?
   g. Why is drainage necessary?

D. Summarize Your Demonstration

E. Question Period

NOTE: Sulfur or sulfuric acid may be used in place of gypsum. The test for sodium in soils may be used as a supplement to this demonstration.

EFFECT OF ORGANIC MATTER ON WATER MOVEMENT

A. Equipment and Materials

1. Sample of soil low in organic matter and sample of soil high in organic matter. For best results, do not use soil types having a high sand content.
2. Two glass cylinders not less than 1" in diameter and 8"-10" in height (tall olive and pickle jars or kerosene lamp chimneys will also work). It is important that the containers be the same size.

B. Previous Preparation

1. Ask your county agent to assist you to obtain the information and materials you will need.
2. Practice the demonstration several times in order to determine the length of time involved in carrying out the various steps outlined below.
3. Arrange materials and equipment (including charts and illustrations) in proper order of use.

C. The Demonstration

1. Introduction

   a. State your name, club, and community.
   b. What is the purpose of the demonstration?
   c. Why did you select this particular topic?
   d. What are your experiences in observing the effect which organic matter has on the soil?

2. Steps in the demonstration

Mark each tall glass cylinder 1/3 of the way down from the top. Fill one cylinder up to this mark with soil sample low in organic matter.

Fill the other cylinder up to this mark with soil sample high in organic matter. Settle the soil in each cylinder by tapping it firmly against the palm of the hand at least 25 times or more, if needed. Add more soil to each jar to bring it up to the mark at top and tap at least 10 more times. Be sure to tap each container the same number of times. Fill each cylinder with water - use a measuring cup for each cylinder and note how much is applied. It may be necessary to add more water but be sure to add the same amount to each jar. Observe the length of time it takes for the water to percolate to the bottom of each cylinder. When the water reaches the bottom in both jars pour off and measure the water left in each jar.

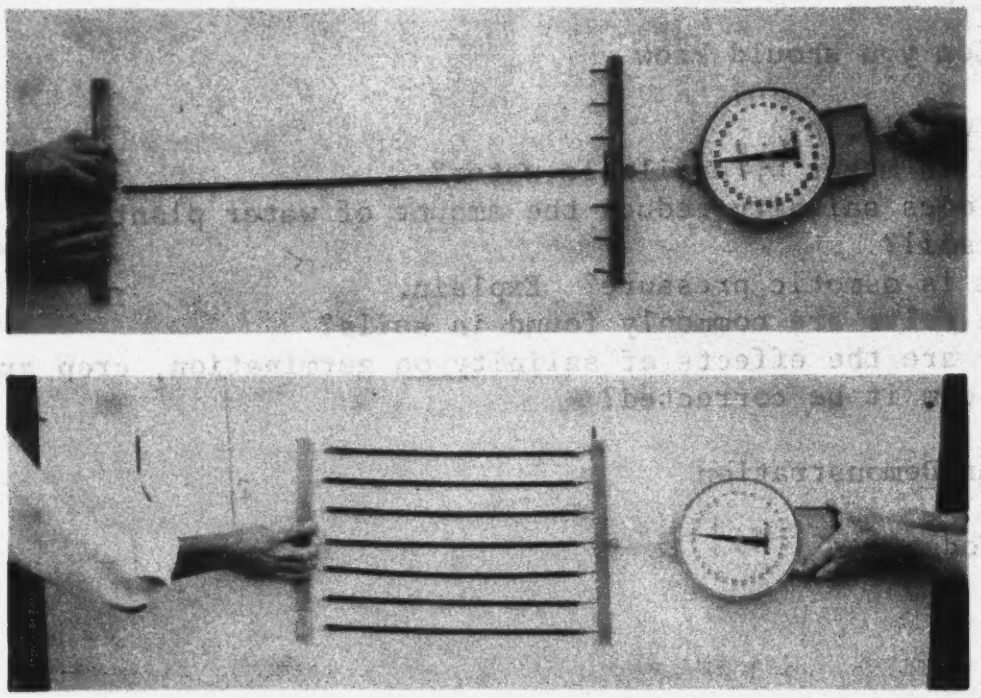
3. Information you should know

   a. Which soil took water more rapidly?
   b. Which soil absorbed the greatest amount of water?
   c. Which soil is most likely to errode first?
   d. What conservation practices would you use to build up and maintain organic matter in the soil?

D. Summarize Your Demonstration

E. Question Period

EFFECT OF SALINITY ON AMOUNT OF WATER AVAILABLE TO PLANTS



A. Equipment and Materials

1. Seven screen door springs
2. One pair of hand scales
3. White posterboard mounted on board

B. Previous Preparation

1. Ask your county agent to assist you to obtain the information and materials which are needed to conduct the demonstration.
2. Rehearse the demonstration several times to get in the habit of doing everything properly.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this topic?
   d. What are your experiences or observations on the effects of salinity?

2. Steps in the demonstration

Explain the principle that plants are required to exert atmospheres of pressure to get water from the soil. Water with no salinity requires 1 atmosphere, with .1% salinity it requires 2 atmospheres, at .2% it requires 4 atmospheres and at .4% it requires 7 atmospheres. This can be demonstrated by hooking one spring to the edge of the board. Hook the scales into the other end and stretch until 14.7# of pressure shows on the scales. Mark this point on the board. Next attach 2 springs to

the scales. Stretch to exert the same pressure, make a mark. Repeat with 4 springs, then 7 springs.

3. Information you should know

   a. Why use 14.7#?
   b. What is meant by available water?
   c. Why does salinity reduce the amount of water plants can obtain from the soil?
   d. What is osmotic pressure? Explain.
   e. What salts are commonly found in soils?
   f. What are the effects of salinity on germination, crop growth?
   g. How can it be corrected?

D. Summarize Your Demonstration

E. Question Period

EFFECTS OF SLOPE ON WATER PENETRATION AND EROSION

A. Equipment and Materials

1. Two metal troughs about 3 feet long
2. One wooden frame
3. Two glass jars
4. Two small ropes
5. Two quart fruit jars
6. Large sized soil sample. Sandy soils work best.

B. Previous Preparation

1. Ask your county agent to help you obtain the necessary information and equipment needed to conduct this demonstration.
2. Prepare charts and illustrations which will assist you in presenting facts related to the results.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this topic?
   d. What are your observations and experiences in your county concerning the effect that slope has on erosion and water penetration?

2. Steps in the demonstration

Fill the metal troughs about 1/2 to 2/3 full of soil and place in the wood frame. Make some small furrows in the soil crosswise of the

trough to keep the water from going down the sides. Suspend the trough with rope to wood frame so that it is nearly level or at least at a very slight slope. The other trough should be suspended on a slope of 15 to 20%. Then set a glass jar under the lower end of each trough. Fill the quart fruit jar with water and pour it into each trough. Note results.

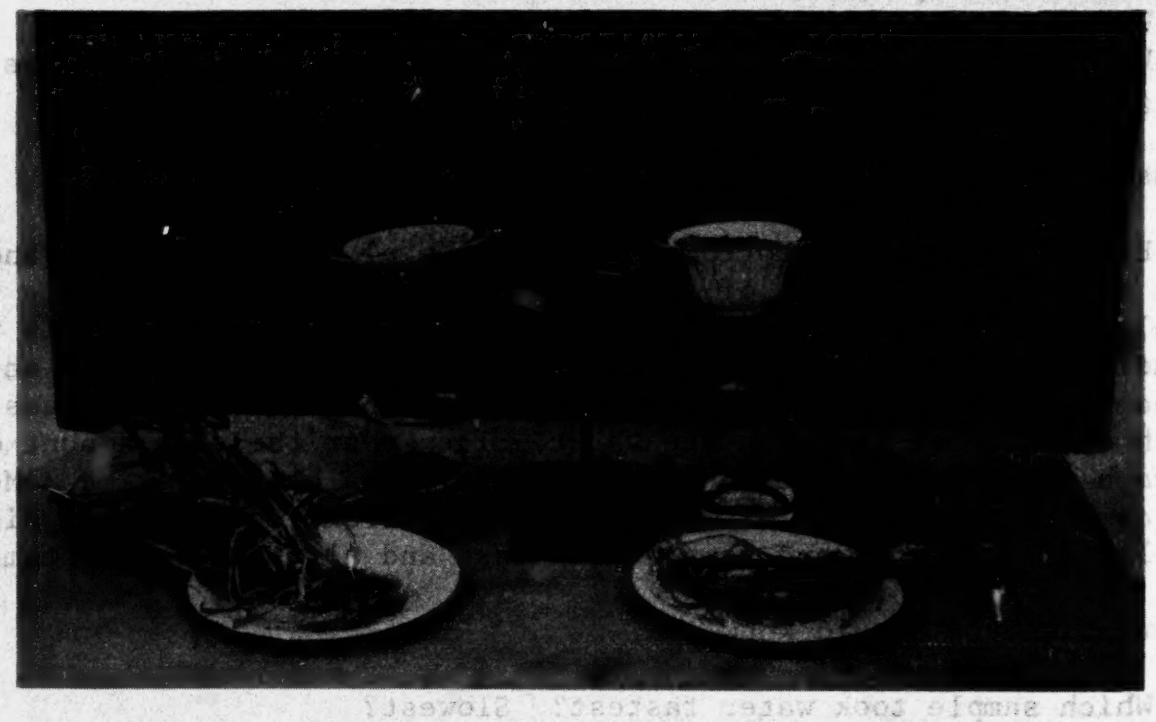
3. Information you should know

   a. What happens to the soil and water when soil is cultivated on excessive slopes?
   b. What conservation practices can be used to prevent erosion and runoff on land having excessive slope?
   c. Would this knowledge of water behavior on slopes of different degrees be of benefit to operations on irrigated farms? How?

D. Summarize Your Demonstration

E. Question Period

GRASS AND LEGUME ROOTS INCREASE WATER ABSORPTION



A. Equipment and Materials

1. Soil samples from three different fields

   a. A field where grass has been grown for three or more years in succession.
   b. A field where grass and alfalfa has been grown three or more years in succession.
   c. A field where alfalfa or row crop has been grown for three or more years.

2. Three glass funnels
3. Three glass containers
4. Three plastic containers
5. Stand for funnels
6. Three pie plates
7. Three pieces of cotton or filter pads same size as plastic containers

B. Previous Preparation

1. Ask your county agent to assist you to obtain the information and materials which are needed to conduct the demonstration.
2. To show how plant roots affect tilth, you will need to place samples of each soil in the pie plates, wet thoroughly and let dry.
3. Prepare charts or illustrations to assist in emphasizing the importance of the results obtained.

C. The Demonstration

1. Introduction

a. State your name, club and community.
b. What is the purpose of the demonstration?
c. Why did you select this topic?
d. What are your experiences or observations relating to the use of grasses and legumes in a cropping system?

2. Steps in the demonstration

Punch holes in the bottoms of the three plastic containers and then fill each about 2/3 full of soil from each soil sample. Crumble the samples so they are not too cloddy. Place the plastic dishes in the funnels on the rack. Then put a filter pad or piece of cotton on top of each sample in order to break the water impact. Place a glass jar underneath each funnel to catch the water. Then pour the same amount of water in each sample and let each drain for the same length of time. Measure and compare the amounts of water that drains from each sample. Display samples of each soil and samples of grass and alfalfa root systems.

3. Information you should know

a. Which sample took water fastest? Slowest?
b. Explain your answers to a.
c. What are the other functions of plant roots?
d. Are farmers in your county using crop rotations? If so, how?

D. Summarize your Demonstration

E. Question Period

ORGANIC MATTER HOLDS SEVERAL TIMES ITS WEIGHT IN WATER

A. Equipment and Materials

1. Two pieces of peat moss of approximately the same size and weight
2. Balance type scales
3. Pail of water

B. Previous Preparation

1. Ask your county agent to help you obtain the information and equipment you will need.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this topic?
   d. What are your experiences or observations in the use of organic matter on your farm?

2. Steps in the demonstration

Place the two pieces of peat moss on the balances and weigh them. If one piece is heavier cut away part until they are the same weight. Record the weight and then soak the piece of peat moss in water about one hour and then weigh. Due to the time involved you may wish to have two samples on hand which have been soaking for approximately one hour. Determine the difference in weight before and after soaking. Compare.

3. Information you should know

   a. How much water did the peat moss soak up?
   b. Does the result of this demonstration have any practical value to farmers?
   c. What conservation practices can a farmer use in actual farming operations to obtain similar results on his farm?

D. Summarize Your Demonstration

E. Question Period

PLANT COVER PREVENTS WATER EROSION

A. Equipment and Materials

1. Two 1-quart fruit jars
2. One lid to fit the jar
3. Small piece of 1/4" rubber hose about 2' long
4. Two small boxes about 18" long, 12" wide and 4" deep
5. Two glass containers
6. One piece of sod soil to fill one box
7. Loose soil to fit the other box

B. Previous Preparation

1. Ask your county extension agent to assist you to obtain the necessary information and materials you will need.
2. Prepare charts and illustrations to help you point out the results of the demonstration.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this topic?
   d. How extensive has water erosion damaged land in your county? On your farm?

2. Steps in the demonstration

Place two boxes of soil, one sod type and the other loose or bare soil, at a slope of about 6%. Construct a spout at the end of each box

where run-off may converge and be caught. Then punch nail holes in 1/2 of the fruit jar top and in the other half punch a hole just large enough for the rubber hose to fit snugly. Put the rubber hose in place by inserting enough of the hose to go within 1/2" of the bottom of the jar with the lid on. Fill the jar with water and tighten the lid to prevent leakage. You can blow air into the jar with the hose to create rainstorm conditions. Sprinkle each box of soil with an equal amount of water. Wait a few minutes and then examine the containers below the spouts.

3. Information you should know

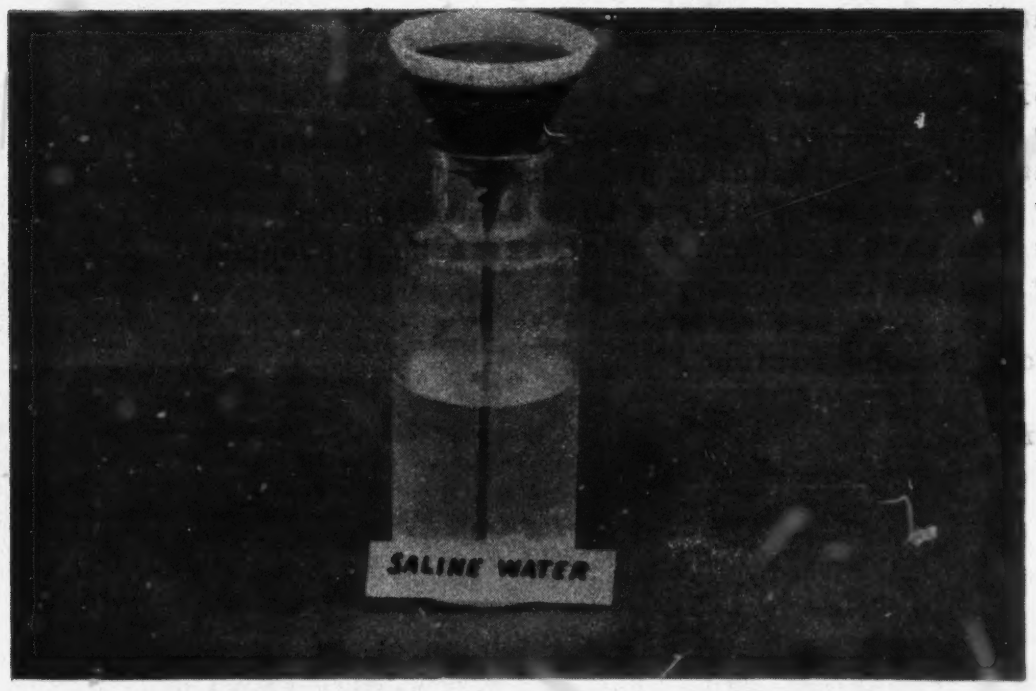
   a. Which container has the clearest run-off? Why?
   b. What kind of plant cover crops can be used to prevent erosion caused by water run-off?

D. Summarize Your Demonstration

E. Question Period

NOTE: You can also demonstrate the erosive action caused by raindrops. Place 1/2" soil in the bottom of a water glass. Then arrange a tin can with a hole in the bottom about 4" directly above the glass. The can should have a small piece of cotton inserted in the nail hole so that raindrops can be created. Pour about 1/2" water in the can and observe the results. Then in another glass put about 1/2" of soil in the bottom and sprinkle the top with grass clippings. Pour water in the can and observe the results. Compare the results of each glass.

SALTS ACCUMULATE ON THE SURFACE OF SOILS



A. Equipment and Materials

1. Sample of a sandy loam soil sieved to pass a 2 mm. sieve
2. One glass, long stem, funnel (about 3" diameter)
3. One bottle about 8" high
4. Small piece of steel wool
5. About one quart of salt water (table salt added to tap water)

B. Previous Preparation

1. Ask your county agent to assist you to obtain the information and materials which are needed to conduct the demonstration.
2. This demonstration will have to be set up a week or 10 days in advance in order to show results.
3. Charts showing the effects of salts in soil and water and how they accumulate will be helpful.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this topic?
   d. What are your experiences or observations on the accumulation of salts in soil?

2. Steps in the demonstration

   Place a small piece of steel wool in the lower end of the funnel stem. Fill the funnel about 3/4 full of soil, add slowly at first so

that the soil will go down into the stem. Fill the bottle about 1/2 full of salt water and place the funnel in the bottle so that the stem hangs in the water.

3. Information you should know

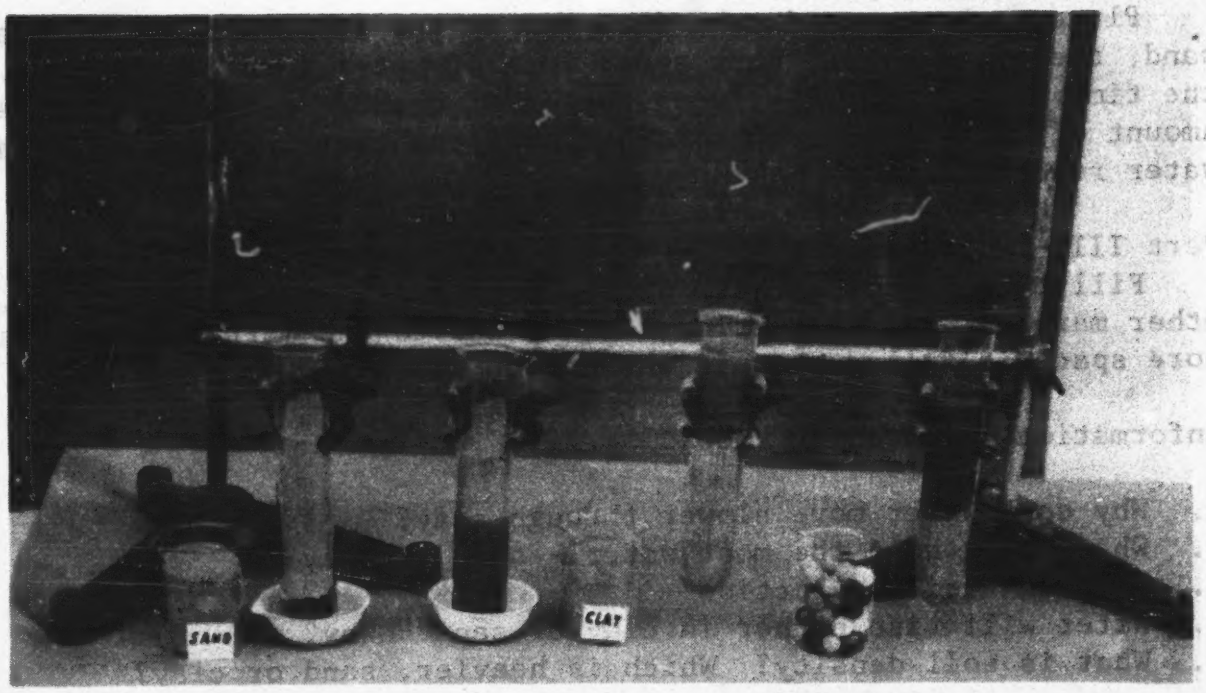
   a. Explain capillary action.
   b. Why does the salt accumulate on the surface?
   c. What salts are usually present?
   d. How does drainage affect this accumulation?
   e. How can this accumulation of salts be prevented?
   f. How can salts be removed?

D. Summarize Your Demonstration

E. Question Period

NOTE: This demonstration can be carried on further if desired and the reverse of the procedure can be shown. By placing the funnel in an empty bottle and adding water to the surface of the soil, the salt can be leached out of the soil. The test for salts in soil and water may be used to supplement this demonstration.

SOME PROPERTIES OF SAND VERSUS CLAY



A. Equipment and Materials

1. Clay
2. Sand
3. Marbles
4. Two plastic or glass tubes open at each end (approximately 1½" or 2" x 12")
5. Two plastic or glass tubes (1½"-2" diameter)
6. Two 100 cc. beakers or jars

B. Previous Preparation

1. Ask your county agent to assist you to obtain the information and materials which are needed to conduct the demonstration.
2. Rehearse the demonstration several times to get in the habit of doing everything properly.
3. Set up Part II before presentation of demonstration.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this topic?
   d. What are your experiences or observations with sand and clay soils?

2. Steps in the demonstration

   Part I - Intake rate
   Fill each of the closed end tubes 3/4 full of soil, one sand, the

other clay. Pour equal amounts of water into each tube and observe the rate the water moves down in each.

Part II - Capillary Action

Place each open end tube in a beaker and fill each with dry soil, one sand, the other clay. Pour about 10cc of water into each beaker. Observe the time. Add more water when bottom of beaker is about dry. Record amount of water each tube absorbs, how long test runs and total height water reaches.

Part III - Pore space

Fill two beakers or jars of equal size 2/3 full, one of sand, the other marbles. Add a portion of the sand to the marbles. When all the pore space is filled measure the amount of sand remaining.

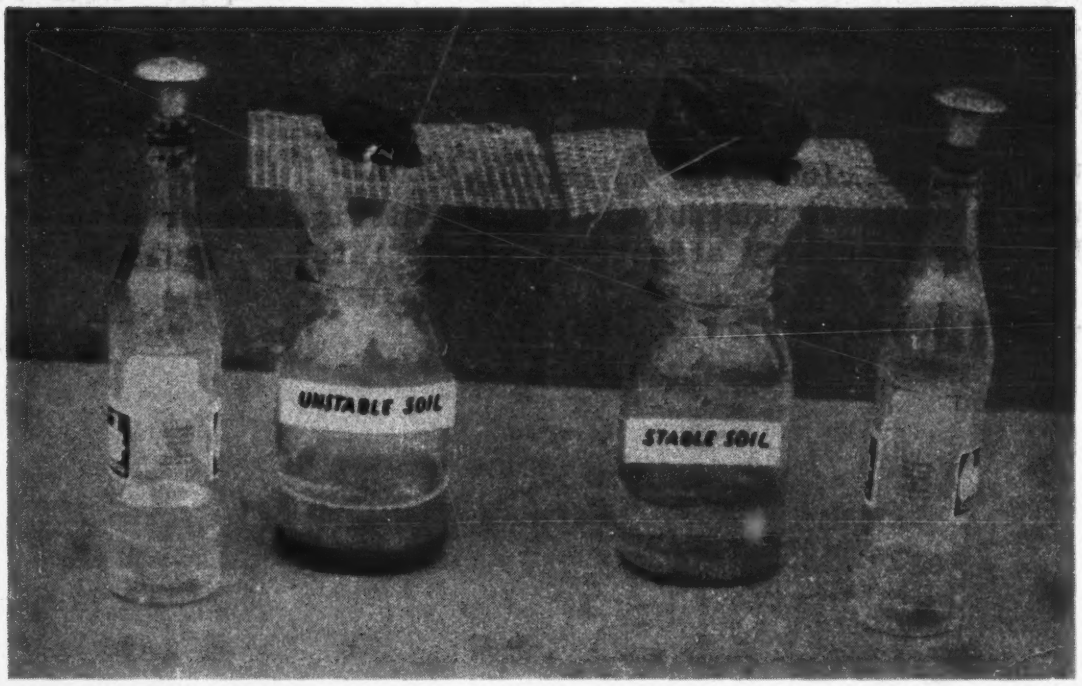
3. Information you need to know

a. Why does water move slower through clay?
b. Which will hold the most water - sand or clay?
c. What is capillary action?
d. Water will rise higher in clay or sand? Why?
e. What is soil density? Which is heavier, sand or clay?

D. Summarize Your Demonstration

E. Question Period

SOIL STABILITY VARIES WITH SOIL TYPE AND MANAGEMENT



A. Equipment and Materials

1. Two quart fruit jars
2. Two pop bottles of equal size
3. Two funnels (4")
4. Two stopper type clothes sprinklers
5. Two pieces of screen wire or hardware cloth (6" square)
6. Soil samples from (a) field poorly managed and low in organic matter or (b) unstable soil type
7. Soil sample from field (a) properly managed and high in organic matter or (b) stable soil type

B. Previous Preparation

1. Ask your county agent to assist you to obtain the information and materials which are needed to conduct the demonstration.
2. Select soil samples and rehearse the demonstration several times in order to get in the habit of doing everything properly.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this topic?
   d. What are your experiences or observations on the stability of soils?

2. Steps in the demonstration

   Take a clod of equal size from each sample. Place funnel on fruit jar with the screen wire on top. Place the clod from the first sample

on the screen. Sprinkle or pour slowly the water from a pop bottle on the clod until the soil has disintegrated and washed through the strainer or the water is used. Repeat with the second sample. Note results and compare the amount of water left in the bottles.

3. Information you need to know

   a. Why did one clod break up rapidly?
   b. What happens to unstable soil under irrigation or natural rainfall?
   c. How does stability affect the intake rate?

D. Summarize Your Demonstration

E. Question Period

NOTE: To illustrate the value of organic matter dip a small clod of the poor soil into liquid manure and repeat the sprinkling and pouring process.

SOIL TEXTURE

A. Equipment and Materials

1. Standard soil texture samples such as sandy loam, loam, silt loam, silty clay loam, clay loam, and clay
2. Small container of water

B. Previous Preparation

1. Obtain and read all the information you can get on soil texture. Your county extension agent will assist you in your hunt for such material. Your local Soil Conservation Service technician will help you obtain the soil samples you will need.
2. Learn to identify soils having different texture. Soils contain different amounts of sand, silt and clay. Sand particles range in size from 2 to .05 mm. in diameter, silt .05 to .002 mm. and clay less than .002 mm. When a soil contains a high amount of sand the word "sand" appears in the textural class. For example, a loam soil having a high percentage of sand is called a "sandy loam".

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this topic?
   d. Why is it important to know soil types?

2. Steps in the demonstration

   Take a pinch of moistened soil sample between your thumb and forefinger. Then rub together so you can get the feel of the soil. Sand has a

coarse, gritty feel, silt has a floury feel, and clay is the sticky material. With a little practice you can readily estimate the amount of each material in the soil sample.

Repeat the process for each of the textural classes of soil samples. Be sure to get the soil wet enough. Otherwise, they are likely to feel much coarser than they are.

3. Information you should know

   a. How does the size of soil particles affect tillage practices?
   b. Which textural class is a weak soil? Strong soil? Why?
   c. How does the size of soil particles affect the storage of water and plant nutrients?
   d. What is the best soil texture for top production of farm crops?
   e. What conservation practices would you recommend on weak soils? Strong soils?

D. Summarize Your Demonstration

E. Question Period

A. Equipment and Materials

1. Standard soil texture samples such as sandy loam, loam, silt loam, silty clay loam, clay loam, and clay
2. Small container of water

B. Previous Preparation

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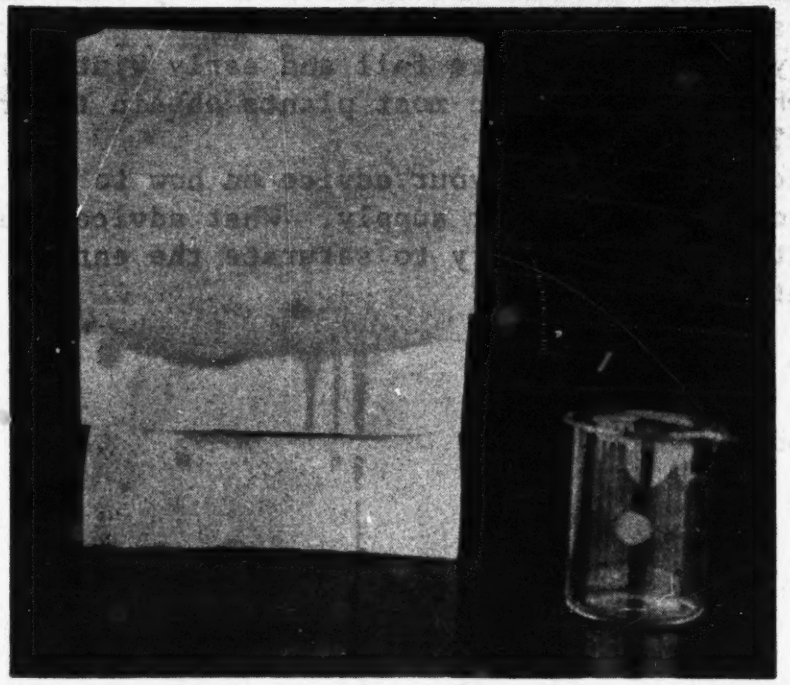
TEMPORARY STORAGE OF WATER



A. Equipment and Materials

1. Four brick size cellulose sponges
2. One baby food can of water

B. Previous Preparation

1. Ask your county extension agent to help you obtain the necessary information and material which you will need to conduct this demonstration.
2. Prepare charts or illustrations which will assist you in emphasizing the main points.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select your topic?
   d. What experiences or observations have you had concerning temporary water storage in the soil?

2. Steps in the demonstration

   Stack the dry sponges on top of each other and pour water evenly over the top of the stack. Observe the sponges as the water percolates downward. It will take several hours for the water to reach the bottom of the stack. For this reason, you may wish to prepare another set of sponges ahead of time in order to show the final results of the demonstration.

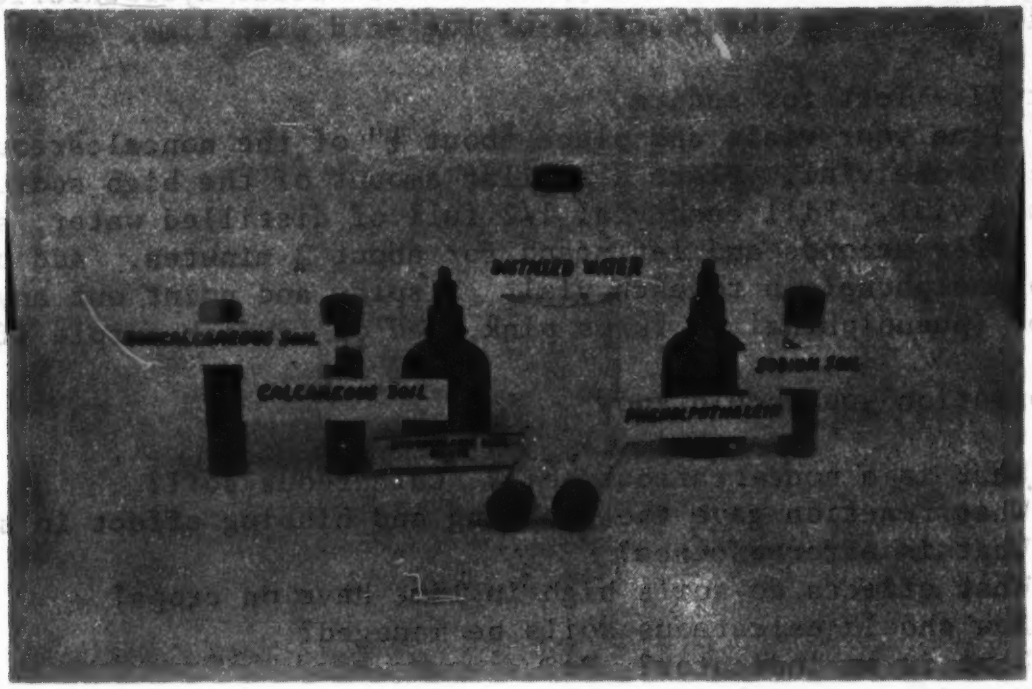
3. Information you should know

   a. Of what value is this information to dry land farmers? Irrigation farmers?
   b. Would you recommend late fall and early winter irrigations? Why?
   c. From what soil depth do most plants obtain their greatest water supply?
   d. Suppose a farmer asks your advice on how to get the most beneficial use from a meager water supply. What advice could you give knowing that it is not necessary to saturate the entire root zone during irrigation?

D. Summarize Your Demonstration

E. Question Period

TESTS FOR LIME (CALCIUM CARBONATE) AND SODIUM IN SOIL



A. Equipment and Materials

1. Soil samples from three different areas
   a. Soil low or free of calcium carbonate (noncalcareous) and sodium
   b. Calcareous soil (high in calcium carbonate)
   c. Soil high in sodium (black alkali salt)
2. Dilute hydrochloric acid (1 N hydrochloric acid)
   CAUTION: This solution is poison and will burn skin and clothing.
3. Phenolphthalein (an indicator)
4. Distilled water
5. Two small clean vials with stoppers

B. Previous Preparation

1. Ask your county agent to assist you to obtain the information and materials which are needed to conduct the demonstration.
2. It will be helpful to prepare a chart showing the reaction of acid with lime.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this topic?
   d. What are your experiences or observations on noncalcareous soils? On soils high in lime? Those affected with sodium?

2. Steps in the demonstration

   Part I - Test for lime

Place about ½ of the noncalcareous, sodium free soil in the bottom of a clean vial. Place a similar amount of the calcareous soil in the other vial. Then add 2 droppersfull of dilute hydrochloric acid to each vial. Point out the reaction of the acid with lime.

Part II - Test for sodium

Clean your vials and place about ½" of the noncalcareous, sodium free soil in one vial. Place a similar amount of the high sodium soil in the second vial. Fill each vial 1/2 full of distilled water, stopper and shake for a few seconds and let stand for about 2 minutes. Add one dropperfull of phenolphthalein to each vial. Display and point out any change in color (phenolphthalein turns pink, red or reddish purple if high Ph).

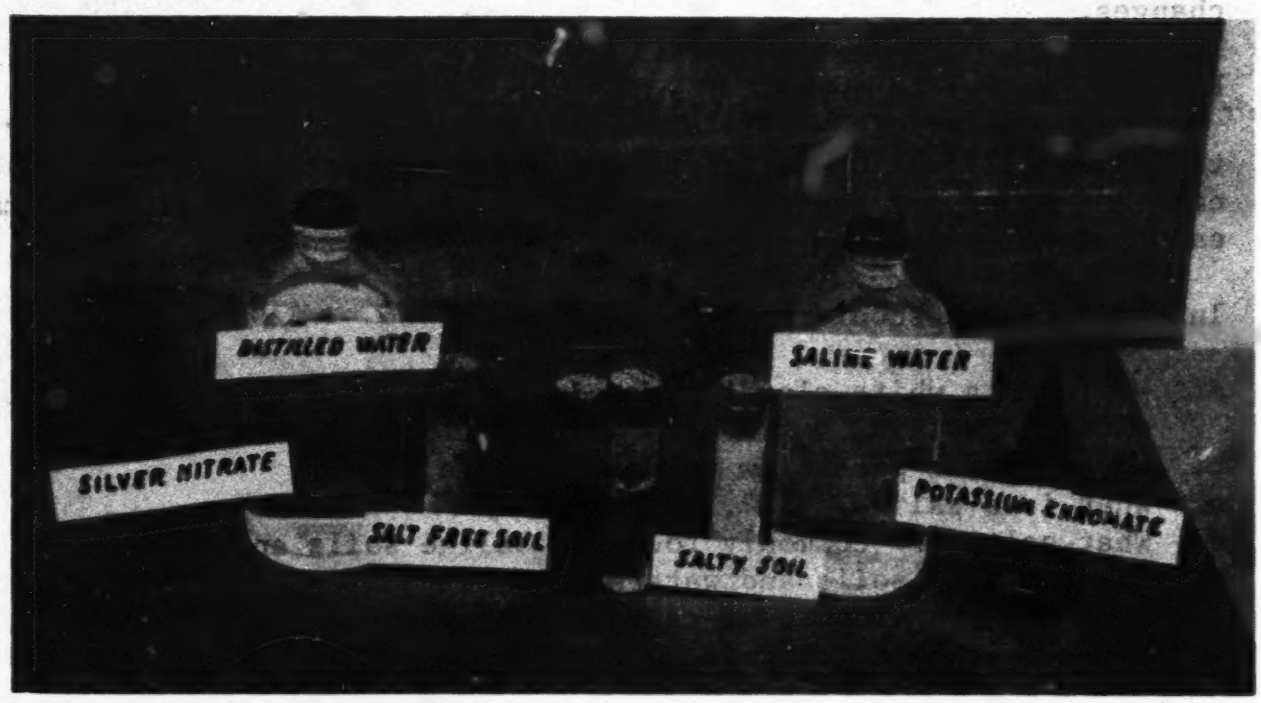
3. Information you should know

a. What is a noncalcareous soil? Calcareous soil?
b. What reaction gave the bubbling and hissing effect in step 1?
c. What is effervescence?
d. What effects do soils high in lime have on crops?
e. How should calcareous soils be managed?
f. What is an indicator? Ph?
g. How does excessive sodium affect the soil? Crops?
h. How can it be corrected?

D. Summarize Your Demonstration

E. Question Period

TESTS FOR SALTS IN SOIL AND WATER



A. Equipment and Materials

1. Sandy soil free of salt
2. Sandy soil with a high salt content
3. Sample of water containing small amount of dissolved salts
4. Distilled water
5. Dilute silver nitrate
   CAUTION: Poison, do not get on skin or in eyes.
6. 5% potassium chromate - POISON
7. Two small clean vials with stoppers

B. Previous Preparation

1. Ask your county agent to assist you to obtain the information and materials which are needed to conduct the demonstration.
2. Rehearse the demonstration several times to get in the habit of doing everything properly.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this topic?
   d. What are your experiences or observations on salts in soil and water?

2. Steps in the demonstration

Part I (Soil)

Place about 1/4" of the salt free soil in the bottom of a clean vial. Place a similar amount of the saline soil in the other vial. Fill each

about 2/3 full of distilled water, stopper and shake. Let stand a few minutes. Add a dropper of silver nitrate to each and point out the results. Add a dropper of potassium chromate to each and point out any changes.

Part II (Water)

Clean your vials. Fill one about 1/2 full of distilled water, and the other 1/2 full of salty water. Add a dropper of silver nitrate to each and point out the results. Add a dropper of potassium chromate to each and point out any changes.

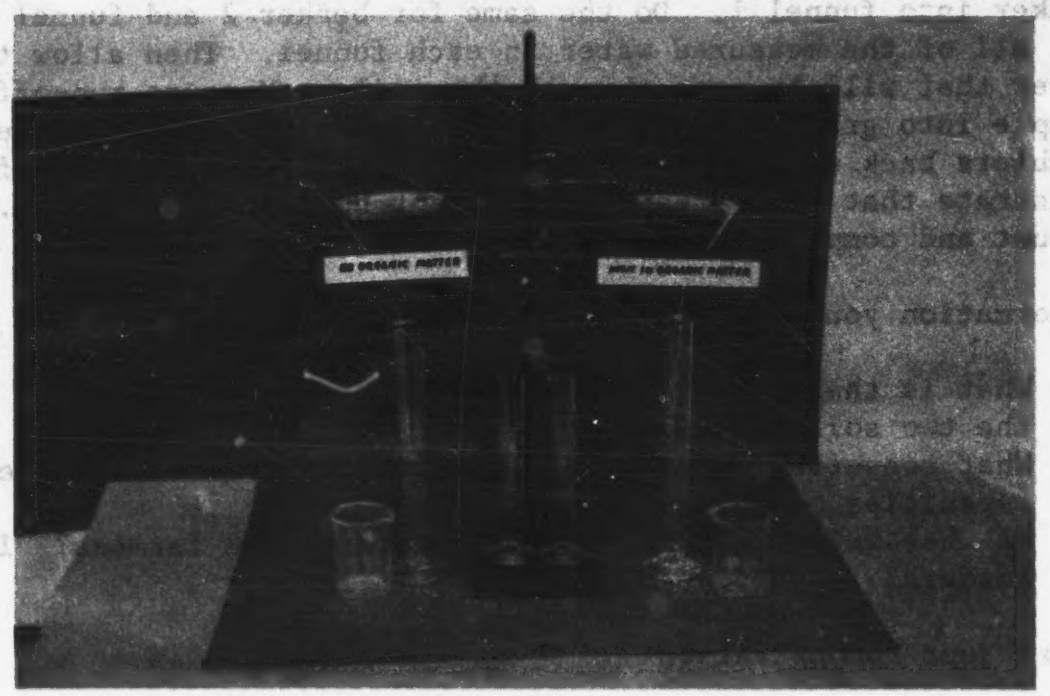
3. Information you should know

a. Why does a white cloud or precipitate form in the saline soil and water? Explain.
b. Why does the potassium chromate change color?
c. What is a saline soil? Water?
d. What salts are commonly found in saline soils and water?
e. Why are some soils and waters saline?
f. What are the effects of salinity on crops?
g. How can it be corrected?

D. Summarize Your Demonstration

E. Question Period

WATER HOLDING CAPACITY OF SOILS



A. Equipment and Materials

1. Two 4" funnels with long stems
2. One funnel rack
3. Piece of steel wool
4. Four 150 mm. beakers
5. Two small glass tumblers
6. One 50 mm. graduated cylinder
7. Sample of soil from cultivated cropland and another from cropland where grass and legumes have been used in rotation. One sample should be coarser textured than the other.

B. Previous Preparation

1. Ask your county agent to assist you to get background information and materials you will need.
2. Prepare charts and illustrations which will enable you to emphasize the important points.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select your topic?
   d. What are your experiences or observations concerning the ways which different soils hold water?

2. Steps in the demonstration

Place the funnels in the rack with a glass tumbler or graduated cylinder underneath each funnel. Put a small piece of steel wool about

the size of a dime into each funnel. Measure a beakerful (150 mm. size) of each soil sample and put the soil in the funnels. Pour 100 mm. of water in each of the other two beakers. Then pour water from the first beaker into funnel 1. Do the same for beaker 2 and funnel 2. Be sure to get all of the measured water in each funnel. Then allow time for all water that will to pass through the soils. Measure run-off from each sample into graduated cylinders and record the amount. Then place the tumblers back under the funnels and pour 50 mm. into each funnel, to demonstrate that saturated soil will not hold any more water. Measure the amount and compare the results.

3. Information you should know

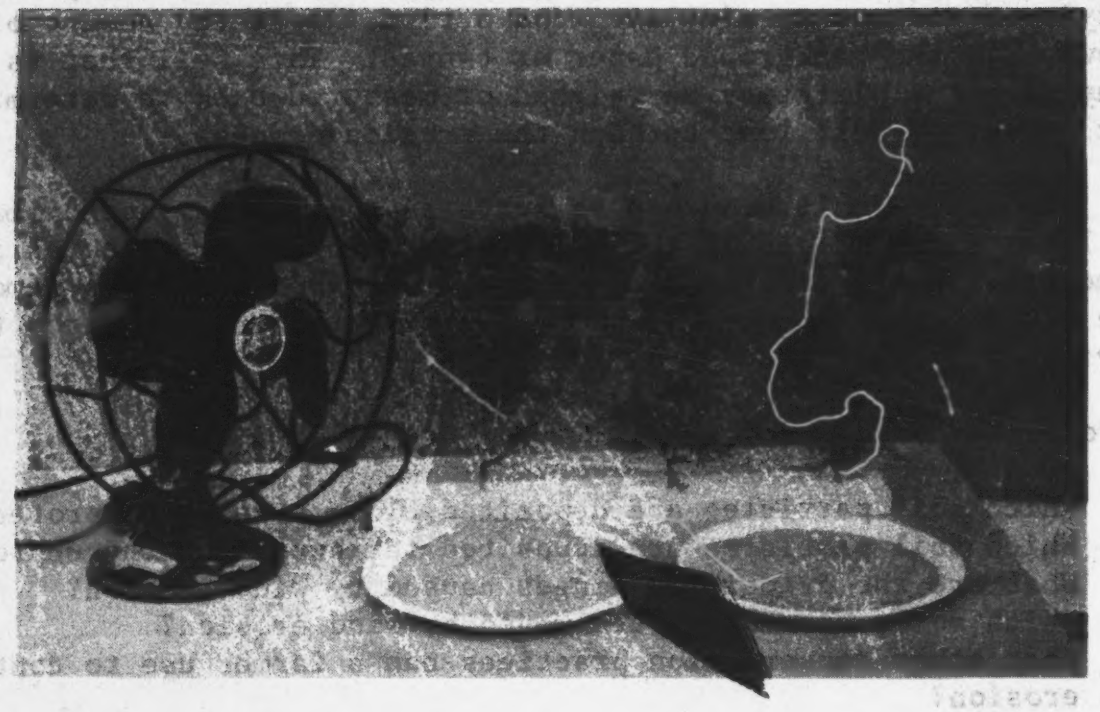
   a. What is the reason for the difference in the amount of water held by the two soil samples?
   b. What conservation practices can be used to increase the water-holding capacities of soils?
   c. Of what value is this knowledge to dry land farmers? Irrigation farmers?

D. Summarize Your Demonstration

E. Question Period

NOTE: You can also demonstrate the water-holding capacities of soils by placing equal volumes of the soil samples in separate cloth bags. Weigh the bags of dry soil and then let them soak in a pail of water. Remove bags and allow the excess water to drain off. Reweigh and compare weights before and after soaking. Repeat the process to show that a saturated soil will hold little if any additional water.

WINDBREAKS CHECK WIND EROSION



A. Equipment and Materials

1. Two pie plates
2. Small windbreak of upright branches 6" - 8". High twigs with leaves work best. Conifer branches work well also.
3. Fairly large electric fan or vacuum cleaner
4. One quart of dry soil
5. Large piece of poster paper or canvas 2' x 4'

B. Previous Preparation

1. Obtain and read all available material you can find on wind erosion and its control. Your county extension agent can help you obtain these references.
2. Prepare charts and illustrations which will be of some assistance to you in emphasizing the important points.

C. The Demonstration

1. Introduction

   a. State your name, club and community.
   b. What is the purpose of your demonstration?
   c. Why did you select this particular topic?
   d. State your experiences or observations on wind erosion.

2. Steps in the demonstration

Fill one pie plate with dry sandy soil. Then place the filled plate on a table or other flat surface about 3' square. Place the wrapping paper or canvas in a vertical position approximately 3' behind the plate

to extend under it. Have the upper and side edges curved towards the plate so that all the soil which is blown from the plate can be caught and measured. Now place an electric fan in front of the plate at varying distances to simulate wind action. Note the amount of soil blown into the background paper or canvas. This soil that is blown away from the plate may be weighed or measured back to determine the percentage of soil lost through the erosion process.

Now place small branches to serve as a windbreak approximately 12" to 18" apart in front of the plate of soil. Be sure the fan is in the same position as used before. Compare the amount of soil removed from the plate having windbreak protection with that removed from the plate having no protection.

3. Information you should know

a. Which soil particles are deposited closest to the unprotected pan?
b. Which soil particles are deposited farthest from the unprotected pan?
c. What are the principle damages caused by wind erosion?
d. Which soils are most often moved by wind erosion?
e. What other conservation practices can a farmer use to control wind erosion?

D. Summarize Your Demonstration

E. Question Period

NOTE: **Wind erosion control demonstrations can also be worked up using such conservation practices as strip cropping, cover crops, residue management and rough tillage.**

Conservation Pledge

I GIVE MY
PLEDGE AS AN AMERICAN
TO SAVE AND FAITHFULLY TO
DEFEND FROM WASTE THE
NATURAL RESOURCES OF
MY COUNTRY—ITS SOIL
AND MINERALS, ITS
FORESTS, WATERS,
AND WILDLIFE

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